



## CLINICAL PRACTICE GUIDELINE

Guideline coverage includes NICU KEMH, NICU PCH and NETS WA

# Oesophageal Atresia/Tracheoesophageal Fistula

This document should be read in conjunction with the [Disclaimer](#)

## Definitions

**Oesophageal atresia (OA):** a congenital anomaly in which the oesophagus ends in a blind upper pouch. Most neonates with OA also have an abnormal connection between the trachea and oesophagus; this is called a trachea-oesophageal fistula (TOF).

**Long-gap oesophageal atresia:** those infants with pure OA or those with OA with a proximal TOF, or those with other variants of OA with a large gap where an oesophageal anastomosis is unable to be performed immediately. Neonates with long-gap OA are often managed with a delayed oesophageal repair or oesophageal replacement surgery.

**Replegle tube:** a tube which is placed into the oesophageal pouch to which is applied continuous low pressure suction (-15cm to -35 cmH<sub>2</sub>O), thus allowing the pouch to be kept clear of saliva and secretions which can spill into the lungs.

Failure of the normal development of the oesophagus and separation of the trachea from the oesophagus results in a spectrum of anomalies that can result in one of the following:

- Oesophageal atresia and distal tracheoesophageal fistula (most common).
- Isolated oesophageal atresia
- Oesophageal atresia with proximal tracheoesophageal fistula.
- H-Type trachea-oesophageal fistula without oesophageal atresia.

In addition, vertebral, cardiac, GIT, genitourinary and limb malformations may be associated with this condition. Once an oesophageal atresia (OA) or tracheoesophageal fistula (TOF) has been diagnosed, the infant should be examined carefully to exclude further anomalies (such as VACTERL, CHARGE association). Genetic studies such as micro array are frequently ordered; these tests should be discussed with either cytogenetics or a geneticist.

**An echocardiogram must be performed pre-operatively in every baby to note the position of the aortic arch and detect any cardiac anomalies.**

Contact cardiologist as soon as oesophageal atresia is diagnosed.

Infants can present with the following signs or symptoms:

- Maternal polyhydramnios.
- Copious oral secretions post-delivery.
- Inability to swallow feeds.
- Coughing and choking with feeds.
- Aspiration of feeds/secretions.

- Inability to pass an oro/nasogastric tube.

If an infant presents with signs of oesophageal atresia or a tracheoesophageal fistula, an attempt should be made to **gently** pass a size 10 FG feeding tube (**a smaller bore tube may curl in the pouch**). If this is met with resistance, an X-ray should be ordered with the feeding tube in place. The upper pouch ends at approximately thoracic vertebra 2-4; lower than this requires further investigation, such as a contrast study. If the X-ray is indicative of an OA or a TOF, a Replogle tube (size 8 <2.5kg babies, size 10 >2.5kg babies) should be inserted to prevent aspiration of secretions. Insert the Replogle tube orally until resistance is felt (usually around 8-10 cm from lips), then withdraw 0.5cm and secure. Note the length inserted and record in the infant's notes. Nurse the infant with the head of the bed elevated. The Replogle tube should be placed on continuous, low suction (-15cm to -35 cmH<sub>2</sub>O).

During the preoperative period, an infant may require intubation for various reasons, aspiration, infection, HMD. Positive pressure ventilation can result in escape of air into the stomach via a distal trachea-oesophageal fistula and, if high pressures are required, may result in catastrophic stomach rupture. The early use of surfactant has reduced the requirement for high pressure ventilation. CPAP and bag and mask ventilation are not strictly contra indicated. **Should the infant require emergency intubation, use the least possible ventilator pressure and alert the surgeons and neonatal consultant immediately.** If the infants' condition deteriorates following intubation, perform urgent transillumination and/or X-ray of the abdomen to rule out pneumoperitoneum. If there is a pneumoperitoneum or a rapid deterioration in the infants' condition, consider emergency needle paracentesis of the abdomen. An urgent surgical consult will facilitate emergency ligation of the fistula and consideration of a gastrostomy.

The pre and post-operative management of the infant is as per general care of the surgical infant. However there are some nursing considerations pertinent to care of the infant with OA/TOF as listed below.

## Pre-Operative Care

### Replogle tube management at KEMH

- Secure the Replogle tube to prevent movement with brown tape.
- Nurse the infant in a head-up position to minimise the risk of aspiration pneumonia and the reflux of acid from the stomach through the fistula.
- Place the Replogle tube on continuous low pressure suction at 2-5 cm H<sub>2</sub>O. Use the closed disposable suction system if available.
- To maintain patency of the Replogle tube, flush with 0.5 mL of normal saline every 15 minutes. Do not leave the syringe attached to the Replogle as this will nullify the suction. Ensure the saline is aspirated back after each flush. Extra flushes may be required if the secretions are thick. Record all flushes on the observation chart (MR489).
- Remove the Replogle tube once every 8-10 hours and flush thoroughly with saline to ensure optimal patency or more frequently if required.
- Replogle tubes are changed **weekly** unless otherwise indicated.

### Replogle tube with Atrium Underwater seal drainage system (PCH)

#### Procedure:

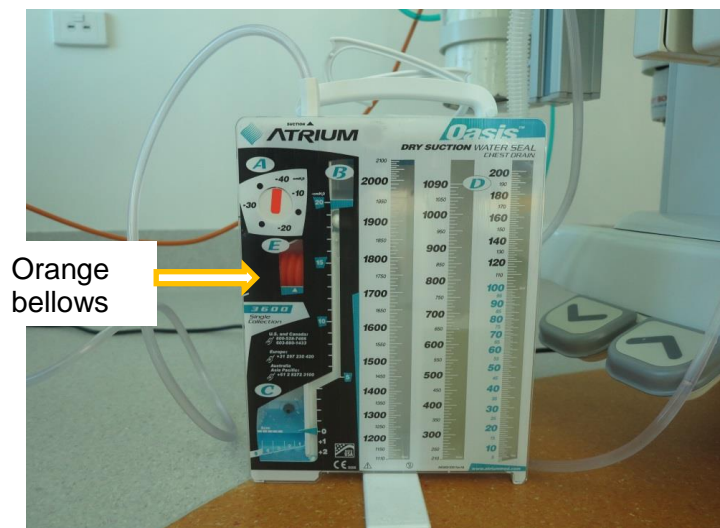
#### Equipment

- "Argyle" Replogle Suction Catheter size 8Fg (<2.5kg) or 10Fg (>2.5kg)

- “Atrium” Oasis Dry Under Water Seal Drain (UWSD) Unit 2000ml
- Suction regulator unit
- Suction tubing
- 2ml syringe of normal saline 0.9% (labelled)
- Sterile water

**Process**

1. Set up suction tubing and “Atrium” UWSD unit with water added to compartment C to 2cm. Connect suction regulator to suction outlet on wall, attach suction tubing to “Atrium” UWSD”
2. Ensure additional suction and suction catheters are at bedside, in case intermittent suction of the oesophageal pouch is required.
3. Nurse infant with head of bed elevated 30-45 degrees.
4. Connect the Replogle tube to tubing on Atrium Oasis Dry Suction UWSD unit.
5. Turn on wall suction to -20 to -70mmhg until the orange bellows is expanded to the arrow on the drain unit. This demonstrates the unit is providing the suction ordered. NOTE: the suction level is controlled by the dialled amount on the atrium drain, NOT the wall suction. It is not necessary to use a low pressure suction unit.
6. Atrium suction control dial is set at -15cmH<sub>2</sub>O to -40cmH<sub>2</sub>O as ordered by the consultant.  
Suction is usually started at -15 but can be increased on Atrium drain to a maximum of -40cm H<sub>2</sub>O if required following discussion with Neonatal Consultant and Surgeon and is ordered and documented in the progress notes.
7. The vent lumen of the Replogle tube is flushed every 15 minutes with 0.5mls of normal saline 0.9%. Check to observe whether the sodium chloride is seen draining back up the Replogle tube. If flushed volume is not returned, assess Replogle tube patency. After flush, remove syringe to allow tube to vent. If no movement of fluid through the Replogle tube, gently aspirate the suction lumen.
8. To maintain patency of the Replogle tube, flush manually 2-4 hourly or more often if required with 2mls of normal saline 0.9%. Disconnect from the Atrium drain and attach a 10ml syringe, gently aspirate with syringe as you flush the saline in.



**If still no movement of fluid through the tube, or no return of sodium chloride 0.9%, remove Replogle tube, flush, ensure it is patent and reinsert. If Replogle tube is blocked and blockage cannot be cleared, replace Replogle tube.**

**Checks and documentation:**

1. Check level of sterile water in suction control chamber on Atrium UWSD is maintained at 2cm.
2. Check pressure hourly, wall and suction control dial document on observation chart.
3. Check Replogle tube position hourly to ensure it remains in-situ at the correct distance at nares/mouth
4. Document 15/minute flushes on observation chart
5. Change the Replogle tube and Atrium UWSD unit weekly, or earlier if necessary. Label the Atrium with the time and date of change.
6. Ensure spare Replogle tube is kept by bedside.

## **Sham Feeds**

### **Aim**

To enable babies with unrepaired long-gap oesophageal atresia, learn to feed orally.

### **Sham feed:**

A feed given to a baby with unrepaired long-gap oesophageal atresia with a Replogle tube connected to suction draining the milk from the upper oesophageal pouch to prevent aspiration. Sham feeding is used to enable the baby to learn how to feed orally either by breast or bottle prior to repair of the oesophageal atresia. After the feed is removed from the oesophageal pouch by suction it is then re-fed to the baby via the gastrostomy tube to enable oral feeding to be associated with milk entering the stomach at the same time.

### **Indications for sham feeding:**

- Infants with long-gap OA awaiting a delayed repair by oesophageal anastomosis or oesophageal replacement surgery
- Infants should be tolerating >100mls/kg/day of bolus enteral feeds via gastrostomy prior to commencing sham feeds.

### **Assessment suitability of infant for sham feeding**

- Infants should be >35/40 corrected age, stable, requiring no respiratory support and able to coordinate sucking, swallowing and breathing
- Infants should be on continuous low pressure Replogle tube suction of the upper oesophageal pouch
- Sham feeding should only be commenced with consent from the infant's Surgeon and Neonatologist

### **Initial Assessment**

1. The patient requires:
  - Continuous cardio-respiratory and oxygen saturation monitoring with normal limits.
2. Ensure patency of Replogle tube prior to commencing sham feed, by flushing Replogle tube with 3ml of normal saline and ensuring 3ml of normal saline is removed from the pouch.

### **Ongoing assessment**

Ongoing assessment of cardio-respiratory status during and post sham feeds with observation for respiratory compromise including:

- Respiratory distress
- Apnoea
- Desaturation with SpO<sub>2</sub> <94%
- Bradycardia
- Stridor

**Assessment of feeding including:**

- Co-ordination of sucking, swallowing and breathing
- Management of feed volume with no coughing, choking or aspiration episodes

If the infant has any signs of respiratory distress/compromise or difficulty with the sham feed then sham feeds should be ceased immediately.

**Equipment**

- New specimen trap (40ml) for each feed
- 30-50ml syringe

**Technique.**

1. Sham feeding may be by breast or bottle.
2. Ensure SpO<sub>2</sub> probe and ECG/respiratory monitor on with limits set (HR 100-200b/min and SpO<sub>2</sub> 90-100%)
3. Disconnect Replogle tube from Atrium UWSD unit. Ensure Replogle tube is in correct position and patent. Flush with 3mls/normal saline and aspirate this back, to clear tube and ensure patency.
4. Attach new specimen trap to Replogle tube and suction tubing. This is to collect the milk feeds. Suction is maintained during the feed.
5. Following completion of the sham feed and re-feeding via gastrostomy tube, disconnect and discard specimen jar. Then flush with 3ml of normal saline 0.9% and gently aspirate the 3ml sodium chloride 0.9% back from the pouch to clear the Replogle tube, and reconnect the Atrium UWSD Unit (suction set between -15cm to -35cmH<sub>2</sub>O, as set prior to sham feed). Ensure wall suction is set.
6. Record sham feed on observation chart.

**Breastfeed:**

- Breastfeeding may start when suck/swallow/breathe is well coordinated.
- During breastfeed infant should be positioned head up with infant's trunk at least 45 degrees upright.
- Initial breastfeeds to be offered after mother has expressed. Initially to only offer 1 breast. If breastfeeding well and volumes tolerated over first 2 days, mother can offer breastfeed without expressing first; increasing as tolerated to offering both breasts at each feed (when infant on 150mls/kg/day bolus gastrostomy feeds).
- When an appropriate volume is taken or the infant is no longer interested in breastfeeding or the specimen jar is nearly full, re-feed the breastmilk by sham into the infant's gastrostomy. This breastmilk needs to be re-fed at the same time as the feed; it cannot be kept later for a feed.
- Give gastrostomy feed at the same time as the sham feed; this gives the infant the sensation of the stomach filling with feed whilst orally feeding.
- Burp infant, as this gets the infant used to burping (which will be necessary post repair of oesophageal atresia).
- Once tolerating sham feeds well, aim to grade infant up over a number of weeks to 4 sham feeds per day.

### **Bottle feeds:**

- Offer bottle feed only if mother planning to bottle feed with EBM/formula and does not wish to breastfeed.
- Initial bottle feed should be 10ml volume or less.
- Warm entire volume, and offer sham feed with a slow flow teat for first 2 days.
- Increase bottle feed by 5ml every 12 hours as tolerated up to a total feed volume.
- While holding infant in a comfortable upright position-place a few drops of EBM/formula on lips to initiate feed. Pace bottle feed as required by infant.
- When an appropriate volume is taken or infant is no longer interested in feeding or the specimen jar is nearly full, re-feed the EBM/formula taken by the sham into the infant's gastrostomy. This EBM/formula needs to be re-fed at the same time as the feed; it cannot be kept for a later feed.
- Give gastrostomy feed at the same time as sham feed; this gives the infant the sensation of the stomach filling with feed whilst orally feeding.
- Burp infant, as this gets the infant used to burping (which will be necessary post repair of oesophageal atresia).
- Once tolerating sham feeds well, aim to grade infant up over a number of weeks to 4 sham feeds per day.

### **Post-Operative Care**

- On return from theatre, the infant will have a **TRANSANASTOMOTIC TUBE (TAT)** in place. The purpose of this tube is to act as a stent for the repair site, as well as for nasogastric feeds once they commence. The tube is marked with green and yellow striped tape.

**UNDER NO CIRCUMSTANCES SHOULD THE TUBE BE REMOVED WITHOUT THE SURGEONS' PERMISSION.**

**If the TAT is accidentally removed, do not attempt to reinsert it, and contact the surgeons immediately.**

- Aspirates should be measured, described, and recorded as for any nasogastric tube.
- If the gap between the oesophageal elements is large, the oesophageal repair may be tight. It may be requested by the surgeon that we nurse the infant in a supine position with the chin tucked onto the chest to reduce tension on the anastomotic site: check the post-operative surgical orders.
- If the gap has been too large to perform a primary repair, a gastrostomy tube may be inserted to facilitate feeding until the secondary repair can take place. (Note: Gastrostomy tubes are NOT aspirated pre-feed). The Replogle tube will remain in situ, and flushing will proceed as before.
- The infant may return from theatre with a chest (wound) drain. This is **not** placed on suction unless specifically ordered by the surgeon. Even low pressure suction may cause damage to the newly repaired oesophagus.
- Any feeds commenced will be via the **TAT ONLY**. A contrast study will be performed approximately 7 days postoperatively to detect any anastomotic leak prior to commencing oral suck feeds.

**No oral feeds (bottle/breast) are to be given until ordered by the surgeon.**

- The head of the bed should be elevated 30-45 degrees when the infant commences feeds. Post oesophageal repair, infants may have some degree of oesophageal dysmotility: elevating the head of the bed, and utilising positioning techniques may help to control reflux symptoms.
- Gastro-oesophageal reflux can be a significant problem in some babies. The early use of omeprazole to protect the anastomosis site and reduce any Heart Burn (pain) can be useful.
- Post-op laryngomalacia is relatively common presenting as a barking cough or respiratory distress making feeding difficult and in the worst cases requiring CPAP.

## Resources

[www.rch.org.au/oara](http://www.rch.org.au/oara)

[www.tofs.org.uk](http://www.tofs.org.uk)

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